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**ENGLISH LANGUAGE TRANSLATION OF
CLAIMS SUBMITTED
IN INTERNATIONAL PHASE**

APPLICANT NAME: Schoen et al.

TITLE: DEVICE FOR THE OPTICAL DISPLAY OF N
SWITCHING STATES

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PCT/EP2004/010486
PEPPERL + FUCHS

NEW CLAIMS

1. Device for the optical display of n switching states of a sensor,
with a sensor casing (34) and
with a plurality of different coloured lighting devices (12)
for the optical display of the information to be transmitted,
each lighting device (12) having at least one lighting element (20),
characterized in
that a transparent casing part (14) is provided as part of
the sensor casing (34) for receiving the lighting elements (20),
that for avoiding optical crosstalk, particularly in the case
of simultaneously active lighting elements (20), the transparent casing part (14) is subdivided by optical interfaces (16) into segments (18) in which the lighting elements (20) are received and
that the transparent casing part (14) with the segments (18) and lighting devices (12) is so constructed and positioned
that the lighting devices (12) are visible by a user from
each azimuth angle within a polar angle range.
2. Device according to claim 1,
characterized in
that in the case of at least one lighting device (12) a plurality of lighting elements (20), particularly light bulbs or LEDs, is provided.

3. Device according to claim 2,
characterized in
that the lighting elements belonging to one lighting device
(12) are placed on opposing sides of the transparent casing
part (14).
4. Device according to one of the claims 1 to 3,
characterized in
that the lighting devices (12) are placed on a printed circuit board and can be arranged in a row and/or in parallel to one another in order to illuminate a lighting segment.
5. Device according to one of the claims 1 to 4,
characterized in
that the transparent casing part (14) is constructed for terminal and/or central installation on an in particular cylindrical, round or polygonal casing.
6. Device according to one of the claims 1 to 5,
characterized in
that the lighting devices (12) are visible to the user from any azimuth direction in a polar angle range between 20 and 180°.
7. Device according to one of the claims 3 to 6,
characterized in
that the optical interfaces (16) are formed by printed circuit boards (22) and/or planar shaped separations and/or insert parts and/or cables.
8. Device according to one of the claims 3 to 7,
characterized in

that a printed circuit board (22) equipped with lighting elements (20) can be slid into the centrally or terminally positioned transparent casing part (14):

9. Device according to one of the claims 1 to 8,
characterized in
that an outer face (24) of the transparent casing part (14)
is at least partly roughened to increase light scattering.
10. Device according to one of the claims 1 to 9,
characterized in
that the transparent casing part (14) is at least partly coloured to avoid viewing inside the sensor.
11. Device according to one of the claims 1 to 10,
characterized in
that the transparent casing part (14) is constructed as part
of a joystick.
12. Device according to one of the claims 1 to 11,
characterized in
that for increasing light scattering light scattering pigments are input in a surface-distributed manner, at least zonally, into the material of the transparent casing part (14).
13. Device according to one of the claims 1 to 12,
characterized in
that for improved leading out of the light, the interior of
the transparent casing part (14) is at least partly silvered.
14. Device according to one of the claims 1 to 13,
characterized in

that the light emission angle (26) for a segment (18) can be limited by cavities (28) introduced in clearly defined manner into the transparent casing part (14).

15. Device according to one of the claims 1 to 14,
characterized in
that the transparent casing part (14) has a plurality of cable bushings (30), particularly with cable insertion, e.g. an insertion bevel, more particularly constructed as part of an optical interface (16).
16. Device according to one of the claims 1 to 15,
characterized in
that the transparent casing part (14) is constructed as a more particularly tubular plug insert (32).
17. Device according to one of the claims 1 to 16,
characterized in
that the transparent casing part (14) is constructed as a more particularly compact end termination.
18. Device according to one of the claims 1 to 17,
characterized in
that the sensor casing (34) is forked.
19. Device according to claim 18,
characterized in
that the transparent casing part (14) is provided on one or both fork ends (36).

20. Device according to one of the claims 1 to 19,
characterized in
that the transparent casing part (14) forms the sensor casing
(34).
21. Device according to one of the claims 1 to 20,
characterized in
that further optical interfaces (16) are formed into the sensor by casting resin.
22. Device according to one of the claims 1 to 21,
characterized in
that the n segments (18) are filled with a random medium,
preferably a sealing or casting compound.
23. Device according to one of the claims 1 to 22,
characterized in
that in at least one of the n segments (18) is provided a
plurality of in particular differently coloured lighting devices (12).
24. Device according to one of the claims 1 to 23,
characterized in
that at least one of the n segments (18) is constructed as an
optical interface for an external computer means, particularly as an IR or UV interface for a PC.
25. Device according to one of the claims 1 to 24,
characterized in
that for the clearly defined light transmission from one segment (18) into another segment (18), the transparent casing part (14) has at least one optical bridge (23) which to a limited extent overcouple the light.

26. Device according to one of the claims 1 to 25,
characterized in
that the sensor is constructed as an inductive, optical, capacitive, ultrasonic, microwave, temperature, fill level, infrared, ultraviolet, pressure and/or flow sensor and/or a position sensor, proximity switch or electrical switching device according to the prior art in industrial automation technology.
27. Device for the optical display of n switching states of a sensor,
with a sensor casing (34) and
with a plurality of different coloured lighting devices (12) for the optical display of the information to be transmitted, each lighting device (12) having at least one lighting element (20),
characterized in
that a transparent casing part (14) is provided as part of the sensor casing (34) for receiving the lighting elements (20),
that for avoiding optical crosstalk, particularly in the case of simultaneously active lighting elements (20), the transparent casing part (14) is subdivided by optical interfaces (16) into segments (18) in which the lighting elements (20) are received and
that the transparent casing part (14) with the segments (18) and lighting devices (12) is so constructed and positioned that the lighting devices (12) are visible by a user from each azimuth angle within a polar angle range, and
that the transparent casing part (14) is constructed for use in motor vehicles as part of a hand brake lever, a gear shift lever, a windscreen wiper lever, a direction indicator lever,

a control button of an air conditioning system, a mirror adjustment button, a window regulator button or a sliding roof button.